

**This listing of claims will replace prior versions, and listings, of claims in the application:**

**Listing Of Claims:**

- 1           1. (Currently Amended) Interferometric apparatus comprising:
  - 2           means for defining a reference frame;
  - 3           a translation stage;
  - 4           an electro-mechanical arrangement for selectively translating said translation
  - 5 stage in at least one of at least two orthogonal directions with respect to said reference
  - 6 frame;
  - 7           at least one thin, elongated mirror mounted in a predetermined manner with
  - 8 respect to said reference frame, said at least one thin, elongated mirror having a
  - 9 reflecting surface and a nominal datum line extending along its longitudinal dimension;
  - 10          at least one interferometer subsystem, including a dynamic interferometer,
  - 11 mounted in a predetermined manner with respect to said at least one thin, elongated
  - 12 mirror; adapted to cooperate with said at least one thin, elongated mirror to measure the
  - 13 displacement of said translation stage in at least one azimuth; and adapted to measure
  - 14 the local slope of said at least one thin, elongated mirror along and orthogonal to its
  - 15 datum line and its local displacement normal to said reflecting surface;
  - 16          control means having a mode of operation for selectively translating said
  - 17 translation stage, said at least one thin, elongated mirror and said at least one
  - 18 interferometer subsystem moving relative to one another in said mode of operation so
  - 19 that said at least one interferometer subsystem scans said at least one thin, elongated
  - 20 mirror along its corresponding datum line to generate a signal containing information
  - 21 indicative of the ~~angular change and surface departure~~ topography of said reflecting
  - 22 surface ~~thereof~~ along with any contributions thereto due to variations present from said
  - 23 electro-mechanical arrangement per se; and
  - 24          signal and analysis means for extracting said information contained in said signal
  - 25 and ~~determining the local shape of said at least one thin, elongated mirror~~ developing
  - 26 correction signals to compensate for errors in optical path length and errors in beam
  - 27 direction related to the shape of said reflecting surface while said control means is in
  - 28 said mode of operation.

2. (Original) The interferometric apparatus of claim 1 wherein said at least one thin, elongated mirror is mounted to said translation stage for movement therewith and said at least one interferometer subsystem is fixedly mounted off said translation stage.

3. (Original) The interferometric apparatus of claim 1 wherein said at least one interferometer subsystem is fixedly mounted to said translation stage for movement therewith and said at least one thin, elongated mirror is fixedly mounted off said translation stage.

4. (Original) The interferometric apparatus of claim 1 wherein said control means is structured and arranged to have another mode of operation in which the motion of said translation stage is measured in at least one azimuth with respect to said reference frame.

1           5. (Currently Amended) The interferometric apparatus of claim 1 comprising at  
2 least two, thin elongated mirrors having reflecting surfaces orthogonally arranged with  
3 respect to one another and each including a nominal datum line extending along its  
4 longitudinal dimension and at least two interferometer subsystems at least in part  
5 mounted off said translation stage, each of said at least two interferometer subsystems  
6 being adapted to scan a corresponding one of said thin, elongated mirrors and  
7 configured to measure the local slope of the scanned mirror along and orthogonal to its  
8 datum line and its local displacement normal to said reflecting surface, said control  
9 means being further configured in said mode of operation to selectively translate said  
10 translation stage in one or all of its possible directions of motion so that at least one of  
11 said interferometer subsystems scans a corresponding one of said thin, elongated  
12 mirrors along its corresponding datum line to generate a signal containing information  
13 indicative of the ~~angular change and surface departure~~surface topography of its  
14 corresponding reflecting surface along with any contributions thereto due to variations  
15 present from said electro-mechanical arrangement per se while the other of said  
16 interferometer subsystems generates a signal containing at least information about the  
17 angular change of said translation stage, said signal combining and analysis means  
18 extracting information contained in said signals ~~and determining the local shape to~~

19 develop correction signals to compensate for errors in optical path length and errors in  
20 beam direction related to the shape of said at least two thin, elongated mirrors.

6. (Original) The apparatus of claim 1 wherein said at least one interferometer subsystem comprises a single beam, plane mirror interferometer subsystem.

7. (Currently Amended) The interferometric apparatus of claim 1 wherein said interferometric apparatus comprises three orthogonally arranged thin, elongated mirrors and three corresponding interferometer subsystems mounted for relative motion with respect to one another while said control means is in said mode of operation to measure the ~~local shape~~surface topography of said mirrors in three dimensions:

8. (Original) The interferometric apparatus of claim 1 further including a photolithographic wafer mount located on said translation stage for movement therewith.

9. (Original) The interferometric apparatus of claim 8 further including a photolithographic exposure unit fixedly mounted to said reference frame for forming masked patterns on wafers located on said translation stage.

1 10. (Currently amended) Interferometric method comprising the steps of:  
2 defining a reference frame;  
3 providing a translation stage for movement with respect to said reference frame;  
4 selectively translating said translation stage in at least one of at least two  
5 orthogonal directions with respect to said reference frame;  
6 mounting at least one thin, elongated mirror in a predetermined manner with  
7 respect to said reference frame, said at least one thin, elongated mirror having a  
8 reflecting surface and a nominal datum line extending along its longitudinal dimension;  
9 mounting at least one interferometer subsystem, including a dynamic  
10 interferometer, in a predetermined manner with respect to said at least one thin,  
11 elongated mirror where said at least one interferometer subsystem is adapted to  
12 cooperate with said at least one thin, elongated mirror to measure the displacement of  
13 said translation stage in at least one azimuth and is also adapted to measure the local

14 slope of said at one thin, elongated mirror along and orthogonal to its datum line and its  
15 local displacement normal to said reflecting surface;  
16 selectively translating said translation stage in a mode of operation in which said  
17 at least one thin, elongated mirror and said at least one interferometer subsystem move  
18 relative to one another in said mode of operation so that said at least one interferometer  
19 subsystem scans said at least one thin, elongated mirror along its corresponding datum  
20 line to generate a signal containing information indicative of the ~~angular change and~~  
21 ~~surface departure~~topography of said reflecting surface ~~thereof~~ along with any other  
22 contributions thereto due to variations present during said step of selectively translating  
23 said translation stage; and  
24 extracting said information contained in said signal and ~~determining the local~~  
25 ~~shape~~developing correction signals to compensate for errors in optical path length and  
26 errors in beam direction related to the shape of said reflecting surface of said at least  
27 one thin, elongated mirror while is in said mode of operation.

11. (Original) The interferometric method of claim 10 wherein said at least one thin, elongated mirror is mounted to said translation stage for movement therewith and said at least one interferometer subsystem is fixedly mounted off said translation stage.

12. (Original) The interferometric method of claim 10 wherein said at least one interferometer subsystem is fixedly mounted to said translation stage for movement therewith and said at least one thin, elongated mirror is fixedly mounted off said translation stage.

13. (Original) The interferometric method of claim 10 having another mode of operation in which the motion of said translation stage is measured in at least one azimuth with respect to said reference frame.

1 14. (Currently Amended) The interferometric method of claim 10 in which there  
2 are provided at least two, thin elongated mirrors having reflecting surfaces orthogonally  
3 arranged with respect to one another with each including a nominal datum line extending  
4 along its longitudinal dimension and at least two interferometer subsystems at least in  
5 part mounted off said translation stage, each of said at least two interferometer

6 subsystems being adapted to scan a corresponding one of said thin, elongated mirrors  
7 and configured to measure the local slope of the scanned mirror along and orthogonal to  
8 its datum line and its local displacement normal to said reflecting surface, said method  
9 being further configured in said mode of operation to selectively translate said translation  
10 stage in one or all of its possible directions of motion so that at least one of said  
11 interferometer subsystems scans a corresponding one of said thin, elongated mirrors  
12 along its corresponding datum line to generate a signal containing information indicative  
13 of the ~~angular change and surface departure~~topography of its corresponding reflecting  
14 surface along with any contributions thereto due to variations present from any other  
15 contributions present during said step of selectively translating said translation stage  
16 while the other of said interferometer subsystems generates a signal containing at least  
17 information about the angular change of said translation stage, said step of extracting  
18 information contained in said signals ~~determining the local shape~~developing correction  
19 signals to compensate for errors in optical path length and errors in beam direction  
20 related to the shape of said at least two thin, elongated mirrors.

15. (Original) The interferometric method of claim 10 wherein said at least one interferometer subsystem comprises a single beam, plane mirror interferometer

16. (Original) The interferometric method of claim 10 in which there are provided three orthogonally arranged thin, elongated mirrors and three corresponding interferometer subsystems mounted for relative motion with respect to one another while in said mode of operation to measure the local shape of said mirrors in three dimensions.

17. (Original) The interferometric method of claim 10 further including the step of mounting a photolithographic wafer on said translation stage for movement therewith.

18. (Original) The interferometric method of claim 17 further including photolithographically exposing said wafer from said reference frame with masked patterns of illumination.

1           19. (Previously Added) Interferometric apparatus comprising:  
2           means for defining a reference frame;  
3           a translation stage;  
4           an electro-mechanical arrangement for selectively translating said translation  
5 stage in at least one of at least two orthogonal directions with respect to said reference  
6 frame;  
7           at least two thin elongated mirrors mounted in a predetermined manner with  
8 respect to said reference frame, said at least two thin elongated mirrors each having  
9 reflecting surfaces orthogonally arranged with respect to one another and each including  
10 a nominal datum line extending along its longitudinal dimension;  
11           at least two interferometer subsystems mounted in a predetermined manner with  
12 respect to said at least two thin elongated mirrors and adapted to cooperate with said at  
13 least two thin elongated mirrors to measure the displacement of said translation stage in  
14 at least one azimuth; each of said at least two interferometer subsystems being adapted  
15 to scan a corresponding one of said two thin elongated mirrors and configured to  
16 measure the local slope of the scanned mirror along and orthogonal to its datum line and  
17 its local displacement normal to said reflecting surface;  
18           control means having a mode of operation for selectively translating said  
19 translation stage, said control means being configured in said mode of operation to  
20 selectively translate said translation stage in one or all of its possible directions of motion  
21 so that at least one of said interferometer subsystems scans a corresponding one of said  
22 thin, elongated mirrors along its corresponding datum line to generate a signal  
23 containing information indicative of the angular change and surface departure of its  
24 corresponding reflecting surface along with any contributions thereto due to variations  
25 present from said electro-mechanical arrangement per se while the other of said  
26 interferometer subsystems generates a signal containing at least information about the  
27 angular change of said translation stage, said signal combining and analysis means  
28 extracting information contained in said signals and determining the local shape of said  
29 at least two thin, elongated mirrors; and  
30           signal and analysis means for extracting said information contained in said signal  
31 and determining the local shape of said at least one thin, elongated mirror while said  
32 control means is in said mode of operation.

1           20. (Previously Added) Interferometric method comprising the steps of:  
2           defining a reference frame;  
3           providing a translation stage for movement with respect to said reference frame;  
4           selectively translating said translation stage in at least one of at least two  
5           orthogonal directions with respect to said reference frame;  
6           mounting at least two, thin elongated mirrors in a predetermined manner with  
7           respect to said reference frame, said at least two thin elongated mirrors each having  
8           reflecting surfaces orthogonally arranged with respect to one another and each including  
9           a nominal datum line extending along its longitudinal dimension;  
10          mounting at least two interferometer subsystems mounted in a predetermined  
11          manner with respect to said at least two thin elongated mirrors and adapted to cooperate  
12          with said at least two thin elongated mirrors to measure the displacement of said  
13          translation stage in at least one azimuth; each of said at least two interferometer  
14          subsystems being adapted to scan a corresponding one of said two thin elongated  
15          mirrors and configured to measure the local slope of the scanned mirror along and  
16          orthogonal to its datum line and its local displacement normal to its reflecting surface;  
17          selectively translating said translation stage in a mode of operation in which said  
18          at least said two, thin elongated mirrors and said at least two interferometer subsystems  
19          move with respect to one another in one or all of said translation stage's possible  
20          directions of motion so that at least one of said interferometer subsystems scans a  
21          corresponding one of said at least two thin elongated mirrors along its corresponding  
22          datum line to generate a signal containing information indicative of the angular change  
23          and surface departure of its corresponding reflecting surface along with any  
24          contributions thereto due to variations present from said electro-mechanical  
25          arrangement per se while the other of said interferometer subsystems generates a signal  
26          containing at least information about the angular change of said translation stage; and  
27          extracting said information contained in said signal and determining the local  
28          shape of said at least two thin, elongated mirrors.

1           --21. (New) Interferometric apparatus comprising:  
2           at least one interferometer including a mirror moveably mounted for displacement  
3           along a path of travel, said interferometer being adapted to direct a measurement beam  
4           with a predetermined diameter,  $d$ , at the mirror to generate a measurement signal

5 containing information indicative of the relative displacement of said mirror and to  
6 generate an information signal indicative of the topography of the mirror and direction of  
7 travel of said measurement beam as reflected from said mirror at points where said  
8 measurement beam impinges on said mirror after having made only one pass thereto;  
9 and

10 signal and analysis means for operating on said information signal to develop  
11 correction signals to compensate said measurement signal for errors in optical path  
12 length and errors in beam direction of said measurement beam related to the shape of  
13 said movably mounted mirror and its angular orientation while moving.--